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ABSTRACT

Using national longitudinal data, this study sought to compare the effect of attending historically black and white institutions of higher education on academic achievement. African American student characteristics and institutional resources were also compared and contrasted. The analyses through hierarchical linear modeling suggested no significant differential effect of attending historically black institutions on the three dimensions of student outcomes: (1) self-reported academic ability; (2) writing; and (3) mathematics. Students at black institutions tended to be more scoioeconomically disadvantaged than those at white institutions, and white institutions tended to have better and more academic resources than black institutions. An appendix lists the variables and coding scheme for the study. (Contains 6 tables and 37 references.) (Author/SLD)

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A Comparative Analysis of Academic Development among African American Students in Historically Black Versus White Institutions

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A Comparative Analysis of Academic Development among African American Students in Historically Black Versus White Institutions

Abstract

Using national longitudinal data, this study sought to compare the effect of attending historically black and white institutions of higher education. African American student characteristics and institutional resources were also compared and contrasted. The analyses of hierarchical linear modeling suggested no significant differential effect of attending historically black institutions on the three dimensions of student outcomes: self-reported academic ability, writing, and mathematics. Students at black institutions tend to be more socio-economically disadvantaged than those at white institutions, and white institutions tend to have better and more academic resources than black institutions.

Historically black institutions were a historical by-product of systematic social discrimination against blacks in the United States. After the U.S. Supreme Court's landmark Brown vs. Board of Education decision in 1954, higher education, however, began to move toward desegregation. Historically white institutions opened their doors to blacks; thus, enrollments at black colleges and universities (BCUs) naturally dropped. To survive, some black institutions merged with local white institutions; others ceased to exist. The majority of black institutions had to open their doors to admit non-black students. Eventually, three of the 105 historically black institutions consisted of predominantly white populations (Wenglinsky, 1996; National Center for Education Statistics, 1999).

During the last two decades, however, the overall enrollment of BCUs increased again, due partly to the admission of non-black students and partly to the growing number of college-going African American students. Approximately 17 percent of all black college students attend BCUs, and 28 percent of the bachelor's degrees awarded to blacks are from historically black institutions (National Center for Education Statistics, 1996). BCUs still seem to play an important role for African Americans in American higher education. Nevertheless, the question of whether these institutions are still needed continues to occupy the U.S. Supreme Court as well as educational policymakers. In this context, documenting the institutional effectiveness of BCUs on student outcomes is greatly needed, because any educational institution's viability should be based on its ability to facilitate student development. Only then will policymakers and the public have empirical data about how well black colleges and universities accomplish their missions and whether it is beneficial to keep and support BCUs. Thus the purpose of this article is to provide some insight on the effectiveness of historically black colleges and universities versus historically white colleges and universities (WCUs) in developing academic abilities of African American students. In addition, this study examines how African American students

attending historically black colleges and universities differ from those attending historically white colleges and universities, as well as how institutional characteristics and academic resources of BCUs differ from those of WCUs.

Related Literature

Studies about Student Characteristics

Black students on BCU campuses tend to have different backgrounds from those of black students at WCUs. BCU students tend to have lower high school GPA and SAT scores compared with all students nationally (McDonough et al., 1997) and compared with blacks in WCUs (Allen, 1992; Gurin and Epps, 1975; Nettles, 1988; Thomas,1992). They tend to come from families lower on the socioeconomic scale compared with their black peers at white institutions (Allen, 1992; Allen and Farley, 1986).

Although Gurin and Epps' (1975) report is outdated, 60 percent of black students at BCUs had fathers who had not graduated from high school, compared with 45 percent of black students at WCUs. On the other hand, using data from the National Postsecondary Aid Study of 1990, Wenglinsky (1996) reported that parents of BCU students are not less educated than those of WCU students, although their incomes are lower. On the basis of his correlation analysis, students at BCUs are more likely to be younger, unmarried, and to live on campus than students at WCUs. Wenglinsky (1996) reported that students at BCUs have lower college GPAs, while Allen (1987) reported the opposite. In spite of the article's contributions, Wenglinsky's findings were sometimes unconvincing because he included both black and white students at the two types of institutions and did not report basic data information. For example, the article did not report how many institutions were BCUs or WCUs, and what percentage or how many of the

sampled 687 black college students and 742 white college students were African American. All this information affects the results on the bivariate analysis.

Allen (1992) states that black colleges enroll students who otherwise might not be able to attend college because of social, financial, or academic barriers. Financial aid packages and low tuition were found to be among the top reasons for students' attendance at BCUs (Wenglinsky, 1996; McDonough, 1997). Along with remedial programs, special financial assistance initiatives have been very high priorities for all the BCUs.

Studies about institutional resources and characteristics

Only limited studies reported on differences in institutional resources and characteristics between BCUs and WCUs. African American students on BCU campuses seem to have different educational opportunities than their peers on WCU campuses. University faculty, facilities, available academic programs, and opportunities for advanced study are poorer in BCUs than in WCUs (Allen, Epps, and Haniff, 1991; Thomas, 1984). Allen (1992) reported that black students have more interaction with both black and white faculty at BCUs than at WCUs. Wenglinsky (1996), however, found no significant difference in student-student interaction and student-faculty interaction between BCU and WCU students. These conflicting findings and the lack of information suggest a need to examine differences in institutional characteristics between BCUs and WCUs.

Studies about institutional effectiveness

A popular assumption is that white campuses provide superior environments for black educational development, but empirical studies offer conflicting evidence. Fleming (1982, 1984) found that black student cognitive gains are higher at BCUs than at WCUs. Fleming (1982, 1984) and Allen (1992) suggested that black students attending BCUs benefit from a more supportive social and academic environment. To assess the comparative effectiveness between

black and white institutions, Wenglinsky (1996) examined the effect on five student outcomes: college GPA, leadership potential, educational aspirations, occupational aspirations, and participation in community service. He concluded that students at black institutions have higher educational aspirations than their peers at white institutions and are more likely to become professionals. (No significant difference was found in the other outcome dimensions.) Controlling for pre-collegiate characteristics, and academic selectivity of the institutions attended, a line of research has suggested that attendance at a historically black institution is positively associated with students' remaining in college and earning a bachelor's degree (see Astin, 1975, 1993; Cross and Astin, 1981; Pascarella, Smart, Ethington, and Nettles, 1987). Allen (1992) noted that the "fit" between African American students and higher education is more favorable at BCUs than at WCUs.

Boyd (1977) reported that most black students adjust successfully at white colleges. Nevertheless, the seemingly successful adjustment may come at a price. Watson and Kuh (1996) compared black and white students at two black liberal arts colleges with those at two white liberal arts colleges, measuring their level of effort. They found that although black students attending white institutions exerted greater effort in all areas, they nevertheless made fewer gains than white students. Watson and Kuh further stated that black institutions provide African American students with a developmentally powerful educational environment.

Allen (1987) contrasted the benefits of attending the two types of institutions. On black campuses, black students gain psychological well-being, cultural affinity, nurturing academic relations, and happiness, while on white campuses they gain impressive physical plants, rich resources, and more diverse program options.

On the other hand, recent studies comparing blacks at BCU and WCU campuses (Bohr, Pascarella, Nora, and Terenzini, 1995; Pascarella, 1996) found no significant differences in

cognitive abilities associated with attendance at historically black versus white institutions. More specifically, Bohr et al.'s study compared freshmen's growth in reading, math, critical thinking, and the composite score of the three measures, whereas Pascarella et al. (1996) compared writing skills and science reasoning. In spite of their use of important measures, both Bohr et al. (1995) and Pascarella et al. (1996) had only two black institutions in their data sets (versus 16 white institutions), which seriously limits their ability to generalize their results.

Only Ayres' study (1982) reported that black students attending white institutions had higher scores on an achievement test (the National Teachers Examination) than did their counterparts at historically black colleges.

Although existing research has helped us to understand the effects of attendance at historically black colleges, it has several important limitations. First, studies often have a different comparative reference: some compared black students at BCUs with those at WCUs, while other studies lumped both black and white students together (Astin, 1968; Centra, Linn, and Parry, 1970; Wenglinsky, 1996). Second, existing research has ignored potentially important confounding factors in the research itself. While most studies investigating the effects of black colleges have controlled for pre-college academic preparation, many have ignored other pre-collegiate factors such as gender, academic aspiration, and socioeconomic status of parents, as well as institution-level factors such as selectivity, enrollment, and single-sex college status, all of which may also influence student development during college. Third, many studies are out of date. We need to reexamine or update the information. Fourth, several studies have limited data with which to generalize their results. Fifth, no study used a multi-level statistical analysis (e.g., hierarchical linear modeling, or HLM) to analyze and compare the two types of institutions. This study used HLM, which has methodological advantages over a single-level standard regression technique for evaluating the effectiveness of schools or programs on student

outcomes (Bryk and Raudenbush, 1992; Burstein, 1980). In the nested data (e.g., students nested within colleges), HLM takes into account the dependencies among observations within clusters.

Methods of Present Study

Data Source and Subjects

Two national longitudinal student data sets and one national faculty data set were obtained from the Cooperative Institutional Research Program (CIRP), sponsored by the American Council on Education and the Higher Education Research Institute (HERI) at the University of California, Los Angeles. CIRP's major purpose is to assess how college affects students.

The subjects consist of 1069 African American freshmen who responded to both an initial survey in the fall of 1985 and the follow-up survey taken during the summer of 1994; 416 attended 10 BCUs, and 653 attended 71 WCUs. Among 105 existing black colleges, ninety-one are four-year institutions (41 public, 50 private), and the rest are two-year colleges. This study is limited to African American students who attended four-year colleges and universities in the United States. Because African American students tend to take much longer to graduate than white or Asian students, it seems reasonable to use nine-year follow-up data to study their development.

The 1989 faculty survey data was selected to keep the student and faculty surveys in the same time frame for this study. The faculty data provides aggregated institutional information including faculty characteristics. HERI has conducted an annual national survey of college and university faculty since 1989.

Variables

Dependent Variables. Academic development was measured by three outcome variables: academic ability, writing ability, and math ability. Academic ability, writing ability, and math ability are operationally defined by responses to the following 1985 and 1994 survey items: "Rate yourself on each of the following traits [i.e., academic ability, writing ability, math ability] as compared with the average person your age. We want the most accurate estimate of how you see yourself." The attributes were measured by self-reports on a five-point scale ranging from lowest 10 percent to highest 10 percent (Astin et al., 1987, p. 110; Higher Education Research Institute, 1992).

Independent Variables. The primary independent variable would be black college status (versus white college status). Two kinds of independent variables are included in two-level analyses: individual-level and institution-level predictors. Individual-level predictors include the initial tests, SAT composite score, high school GPA, age, gender, degree aspiration in 1985, and family socioeconomic status. Institution-level predictors consist of selectivity (based on SAT combined scores), single-sex college status, institutional control (public or private college), total enrollment, total instruction-related expenditure per full-time equivalent (FTE) student, percentage of total instruction-related expenditure, student-faculty ratio, student-faculty interaction, and percentage of faculty with a Ph.D.

I included single-sex colleges in the HLM analyses for two reasons. Kim's studies on the effectiveness of women-only colleges (1995, 2001) suggest that the effects of black colleges and women's colleges can be confounded, so researchers need to isolate one from the other. The data sets include 10 single-sex colleges; among them are one men-only black college and one women-only black college. However, I chose to control for single-sex college status (rather than women's college status) not only because the data sets have only one black women's college, but

also because Astin (1993) reported that students in both men's and women's colleges seemed to develop better academically than their coeducational counterparts.

Approach to Data Analysis

As a preliminary analysis, means, percentages, standard deviations, correlation, t-tests, and cross-tabulations were used to analyze differences and similarities among institutional characteristics of BCUs and WCUs. This article, however, presents only results of means, standard deviations, and t-tests to compare BCU and WCU student and institutional characteristics.

To answer the principal question of this study, an HLM method was used. HLM models in the study were built in a progressive order. After a reasonable individual-level model was constructed, an institution-level model was built on top of it. The effects of college global characteristics (e.g., selectivity, single-sex college status, and enrollment) were adjusted to isolate the effect of attending a black college. The model is called a global college model, and it was constructed to test the hypotheses. That is, the hypotheses were tested after including global institutional characteristics in the equation but before including internal institutional characteristics. I used an alpha level of 0.05 to test this study's hypotheses. Finally, internal college characteristics were explored to understand their predictivity. If any significant institutional effects were found, investigating internal college characteristics could help identify some possible reasons for the effects. The final model, including all possible variables, is called a full model. In the HLM analyses of academic ability and math ability dimensions, the global college model and the full model are the same because no internal institutional characteristic was significant.

Limitations

There are several limitations to this study. Above all, it uses existing national data sets, although it would be ideal to collect data sets specifically for this study. To capture overall academic ability, I selected the items of respondents' self-reported academic ability, math ability, and writing ability from the surveys. Although some may consider using self-reported data a limitation, studies (Astin, 1991, 1993; Pace, 1985) indicate that self-reported responses of college students are quite valid. Even during the analysis of this study, I observed strong positive associations between self-reported academic ability and SAT scores. It is fair to question whether the three academic measures can sufficiently capture students' academic ability developed in the various disciplinary areas and from different classes. Certainly they cannot capture all the dimensions of academic ability, but they can capture part of it. Finally, even though having longitudinal data sets with pre-college data and a nine-year follow-up survey is the strength of this study, it would be better if a future study could connect several data sets measured at intervals during the nine-year period.

Results and Interpretations

Characteristics of Historically Black Colleges and White Institutions

Characteristics of historically black colleges and white institutions were examined. Table 1 presents means, standard deviations, and t-test results comparing their institutional characteristics. BCUs and WCUs exhibit different institutional characteristics in average faculty salary, student-faculty ratio, percentage of faculty with a Ph.D., total instruction-related expenditure per FTE, percentage of total instruction-related expenditure, percentage of undergraduates receiving aid, and total student enrollment and selectivity (based on SAT composite scores). Student-faculty ratio and total enrollment appear to be the only advantages

BCUs have over WCUs for student development, given that previous studies (Astin, 1977, 1993; Pascarella and Terenzini, 1991) report that a lower student-faculty ratio is better and smaller colleges are more positive for student development in general. Total instruction-related expenditure per FTE in BCUs was much lower than in WCUs ($6,506 vs. $8,645), while the percentage of instruction-related expenditure by WCUs and BCUs does not significantly differ. Average faculty salary and percentage of faculty with a Ph.D. were much lower in BCUs. The percentage of undergraduates receiving aid was much higher in BCUs (84% vs. 61%), which is not surprising because a high proportion of black students are economically disadvantaged. The percentage of students transferring before graduating does not significantly differ between BCUs and WCUs. Overall, BCUs appear to have fewer (and poorer) academic-related resources than WCUs.

Characteristics of African American Students in Black versus White Institutions

Table 2 shows the results of t-tests comparing characteristics of entering African American students in BCUs and WCUs. Black students attending WCUs seem to have higher socioeconomic-status parents (based on higher parental income and father's education). However, there is no difference in mothers' education level. Black students attending BCUs tend to be slightly older than black students in WCUs; however an age difference of 0.06 on the 10 point scale appears to have no practical importance. While selectivity (based on mean SAT) shown in Table 1 reflects average SAT composite scores of the sampled institutions split by type of institution (institutional data), SAT scores in Table 2 reflect mean SAT composite scores (aggregate data from the sample) of black students attending the two types of institutions. Both SAT scores and high school GPA are significantly higher among blacks attending WCUs than those at BCUs. There was no significant difference in the pretest of writing ability. However,

blacks in WCUs rated their academic ability and math ability higher than their counterparts in BCUs.

Institutional Effectiveness of Black versus White Institutions

To discern the effectiveness of BCUs compared with WCUs, the three null hypotheses, one for each of the three outcome measures, were examined through HLM analyses. They posit that there is no difference in institutional effectiveness between BCUs and WCUs in African American students' development of (1) academic ability, (2) writing ability, and (3) math ability.

Table 3 summarizes an unconditional Analysis of Variance (ANOVA) model, which is a preliminary step for most HLM analyses. To limit the number of tables in the article, I extracted and assembled only the most useful information, such as grand means, standard errors, and variance decomposition, from the ANOVA model. (Determining the proportion of institution-level variability and individual-level variability requires a simple hand calculation. See Bryk and Raudenbush, 1992.) The three variables are similar in regard to size of grand means and standard errors. Notably, most variability is located at the individual level rather than at the institution level. This proportion of institution-level vs. individual-level variability suggests that most students' academic development may be explained by individual student characteristics rather than group characteristics.

Tables 4, 5, and 6 contain the results of HLM analyses. They list all variables included in their respective models, as well as the corresponding b coefficients, standard errors, and t-ratio. The criteria for variable selection was t=1.5, unless a theory or a related study suggested that a particular variable should be adjusted to account for college effects. I included all pretests and SAT scores regardless of their contribution. In what follows, I will present the results of HLM analyses for three outcomes separately and discuss major or interesting findings.

Academic Ability

Individual level. The individual level includes four predictors, all positively associated with self-reported academic ability in 1994 (Table 4). These four variables explain 6 percent of within-group variance. Both SAT composite scores and high school GPAs were very significant contributors, suggesting that self-reported academic ability is strongly associated with real academic ability or performance scores. It is interesting that in spite of a nine-year gap, pretest of academic ability was the most significant contributor. This pattern was consistent with the other outcomes. Surprisingly, parental education was not a significant predictor for self-reported academic ability in 1994, although parental income contributed to the outcome a little. After a sensible individual-level (level 1) model was composed, an institution-level (level 2) model was built.

Institution-level Analysis. Mean pretest academic ability, mean parental income, selectivity, and black college status were included in the institution-level model, along with four individual-level variables (Table 4). No internal college characteristics were significant after taking into account the four global college characteristics, which made the global college model and the full model the same. Surprisingly, these four institution-level variables explain 97 percent of institution-level variance. The variance component of Table 4 shows that the standard deviation of institution-level intercept dropped to almost zero, and the *p* value exceeded 0.50. In other words, little variability remained after taking into account the four institutional characteristics.

The null hypothesis (i.e., historically black and white institutions do not differentially affect development of self-reported academic ability among African American students) was not rejected (p=0.339). Although black college is a positive predictor for academic ability, as rated in 1994, the b coefficient was small. When we consider practical significance, the difference in

mean academic ability between BCUs and WCUs is only 0.078 on a five-point scale. This result suggests that attending a black college makes no significant difference in developing academic ability, controlling for mean pretest of academic ability, mean parental income, and selectivity. Selectivity was highly significant in the equation without mean pretest of academic ability. Its coefficient, however, dropped dramatically and became insignificant once mean pretest was added to the model. This drop pattern suggests that selectivity and mean academic ability share a significant amount of predictivity. The global college model and the full model are the same because no internal college characteristics were added.

Writing Ability

Individual-level Analysis. The four variables included were pretest writing ability, SAT, being female, and father's educational level (Table 5). All these were positive and significant predictors for self-reported writing ability in 1994. These four predictors accounted for 7 percent of the individual-level variation.

Students' initial rating of writing ability was a very strong contributor. Consistent with educators' typical observations on female students' strengths in verbal ability, being female was positively associated with self-reported writing ability. Students with higher SAT scores also tend to write better. Fathers' formal education level seems to significantly affect black students' writing ability too.

Institution-level Analysis (Global College Model). Four institution-level predictors (mean pretest of writing ability, selectivity, single-sex college status, and black college status) were included, in addition to the four individual-level predictors (Table 5). The hypothesis (i.e., historically black and white institutions do not differentially affect self-reported writing ability) was not rejected by the model ($p=0.943$) presented in Table 5. Controlling for mean pretest, selectivity, and single-sex college status, the effect of black college status was close to zero

(b=0.0077, t=0.072, Table 5). Practically, no differential effect on writing ability is expected whether an African American student goes to a historically black college or a white institution.

It is important to mention that in the model omitting single-sex college status, black college was a significant positive predictor. If I had not isolated the single-sex college effect, which the previous studies on black colleges failed to do, the result would have favored black colleges. Probably, some effects that we have assumed to be overall black college effects may be attributable to having some single-sex colleges among the black colleges in the data set.

Institution-level Analysis (Full Model). Five institution-level predictors were included to create the full model. Eighty-nine percent of institution-level variance was explained by these institution-level predictors. Controlling for the four global college characteristics in the model, only the percentage of faculty having a Ph.D. was a significant predictor among the internal institutional characteristics considered (see Table 5). The variance components (bottom of Table 5) suggest that very little unexplained variation remained at the institution level ($p>0.50$).

Math Ability

Individual level. The individual-level model consists of math pretest, SAT composite score, and father's education. These three predictors account for 16 percent of the individual-level variation. Again, the pretest was a highly significant predictor for the posttest on math ability (Table 6). While most people may expect that fathers' education would be a positive predictor for students' math ability, the findings indicate the reverse. Yet, in the previous section, fathers' education was a positive predictor for writing ability. My speculation is that highly educated fathers are less likely to work in science or technically oriented fields. I further speculate that considering similar behavioral patterns between generations, black students follow occupational paths similar to those of their fathers.

I included mothers' education level because studies indicate that black culture tends to be matriarchal. This turned out not to be a significant predictor for the three outcomes. It is possible that the family background of black students attending four-year colleges differs from that of the general black population.

Institution level. Four institution-level variables (mean pretest of math ability, black college status, selectivity, and single-sex college status) were included in the institution-level model. No internal college characteristics were significant, holding constant the four global college characteristics; thus the global college model and the full model were the same. The four variables explain 96 percent of the total institution-level variation. No other institution-level variables considered were significant, after controlling for these four variables. The p-level of institution-level variance, $p>0.50$ (bottom of Table 6), also indicates that there is little unexplained variation left at the institution level.

The null hypothesis (i.e., there is no difference in institutional effectiveness between BCUs and WCUs in African American students' development of math ability) was not rejected ($p=0.202$). Controlling for mean pretest, selectivity, and single-sex college status, black college status was an insignificant predictor. Single-sex college status added little to the explanation of the institution-level variation. However, I included it in the model because I noticed a change in the effect and significance level of black college status between the models without single-sex college status (BCU: $b = -0.0704$, $t = -0.751$) and the model with single-sex status (BCU: $b = -0.1367$, $t = -1.276$). The negative effect of black college attendance on math ability became stronger by controlling for the positive effect of single-sex college status. It was interesting to see the negative effect of black college status and the positive effect of single-sex college status on math ability in the same model, although neither was statistically significant.

To sum up, no difference between historically black colleges and white institutions was found in African American students' development in any of the three dimensions: academic ability, writing ability, or math ability. A partial explanation for why only a few institution-level predictors accounted for the high proportion of institution-level variability may be that the institution-level variation in the college mean tends to be small to begin with (0.219 standard deviation for academic ability, 0.144 for writing, and 0.179 for math—not shown in tables). The global college model and the full model are the same because no internal college characteristics were added.

Discussion and Conclusions

Based on national longitudinal data sets, this study attempted not only to fill a gap left by previous studies, but also to extend the terrain of studies on the institutional effectiveness of black colleges on African American students' academic outcomes. This study also attempted to gain insight on the institutional academic environment and the characteristics of black students attending both types of institutions. Moreover, it aimed to provide empirical information that can help inform policymakers and the public regarding the effectiveness of both historically black colleges and white institutions in facilitating African American students' development.

Institutional characteristics of black colleges and universities. The average SAT score of students at white institutions is much higher than that of students attending black institutions. Low SAT scores at BCUs seem to reflect the reality that many BCUs have an open admission policy. Also, overall academic resources at BCUs are much poorer than at WCUs. Total instruction-related expenditure per FTE, average faculty salary, and percentage of faculty with a Ph.D. were found to be significantly lower at BCUs. Not surprisingly, the percentage of undergraduates receiving financial aid is much higher at BCUs than at WCUs. However, both

student-faculty ratio and total student enrollment were smaller at BCUs. Studies of college impact indicate that a lower student-faculty ratio and smaller institutions are generally considered to be favorable factors in the college environment (Astin, 1993; Pascarella and Terenzini,1991). Fewer Ph.D.'s and lower average faculty salary may partially explain how BCUs can afford to maintain a lower student-faculty ratio.

Black student characteristics at black colleges and universities. Black students at BCUs tend to be academically less prepared in terms of high school grades and SAT composite scores, and their parental income and fathers' education levels tend to be lower than those of their peers at WCUs. Although there is no significant difference in students' initial writing ability, both math and academic abilities are higher among black students entering white institutions. The findings of students' poor academic preparation and low parental socioeconomic status are consistent with Allen's findings (1992). African American students at BCUs are slightly older than those at WCUs, though this difference is not significant. This result is somewhat different from Wenglinsky's report (1996) on students' age.

The effectiveness of black colleges and the reasons. Through HLM analysis, all three null hypotheses were not rejected. Controlling for students' pre-college characteristics and global institution characteristics, attending black colleges does not appear to be more beneficial in developing black students' overall academic ability, writing ability, and math ability than attending white institutions. More specifically, BCU attendance was a positive predictor for self-reported academic ability and writing ability, while it was negatively associated with math ability when adjusting for other significant or important control variables in HLM equations. However, because the effect of BCUs on writing ability was statistically insignificant (close to zero), discussing this aspect is of little value.

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The finding of no differential effects between the two types of institutions on the academic domain is somewhat consistent with previous studies by Bohr, Pascarella, Nora, and Terenzini (1995), Pascarella, Edison, Nora, Hagedorn, and Terenzini (1996), and Centra, Linn, and Parry (1970). But these studies did not use the nationally representative data.

This study also searched for the reasons for any differential institutional effects and the effects of internal institutional characteristics on the three outcomes. Because no significant differential effect was found, pursuing reasons was unnecessary. Nevertheless, I checked the coefficient changes of black college while including the variables of internal college characteristics in HLM equations. Among the internal college characteristics considered, only one variable, the percentage of faculty with a Ph.D., was a significant positive predictor for the development of writing ability. Based on the significant coefficient change of black college status on writing ability (when this faculty variable was held constant), it appears that the lower percentage of faculty with a Ph.D. in BCUs has a detrimental effect on students' development in writing ability. Faculty with a Ph.D. could demand more academically rigorous papers from students, thus developing their writing skills. None of the internal college characteristics considered seemed to explain the outcome measures of academic ability and math ability, controlling for global college characteristics such as mean pretests and selectivity in admission. Notably, the global college characteristics of the models explained most of the total institutional level variance, leaving very little unexplained variance.

However, a majority of the previous studies reported a significant effect of BCUs on black students. The results of this study differ from some of those in previous studies for several reasons. First, previous studies on historically black colleges did not isolate or consider the effects of single-sex colleges among black colleges. In other words, some of the previously reported success of BCUs could be attributed to single-sex colleges among BCUs, as the findings

of this study suggest. It provides an important signal that future studies on black colleges should isolate the effect of single-sex colleges for more accurate conclusions. Second, this study adjusted for other potential confounding factors such as selectivity, total enrollment, parental socioeconomic status, high school GPA, and pretests. Third, the previous studies and this study used not only different data sets, but also different data collection terms. While this study used longitudinal data collected with a nine-year gap between pretests and posttests, most other studies used either cross-sectional data or longitudinal data collected in a relatively shorter term. Fourth, this study used a multi-level modeling technique, while others used standard single-level regression analysis. Fifth, the discriminatory climate at WCUs may have eased with the passage of time after the desegregation movement.

Conclusions. The finding of no significant difference between the two types of colleges throughout all three outcomes was rather surprising. However, it may be a positive sign that African American students, as a group, now benefit equally in their academic development whether they attend BCUs or WCUs. Thus, African American students seem to have wide choices in pursuing higher education. In spite of their lack of academic resources, BCUs do not seem to differ from WCUs in their effectiveness. In fact, historically black colleges appear to be more cost-effective in achieving their mission of educating black students. The question of how BCUs manage to produce the same level of outcomes as WCUs in spite of poorer academic resources still needs to be investigated in future studies. Thus the public and the judicial system should not decide to close or merge black colleges just because they show no significant differential effect on black students' academic development. Other types of institutions might have something to learn from black colleges. As Allen (1987, 1992) and Fleming (1982, 1984) noted, the success of black colleges may be mainly attributed to their culturally and psychologically supportive and nurturing climate for African American students. Or, as Watson

and Kuh (1996) noted, due to feelings of alienation and frustration, as well as the lack of campus support at WCUs, African American students may expend much energy and time that could be used for their academic advancement. Whatever the case, future studies should investigate any aspects of black colleges that might explain how they compensate for the great gap in institutional resources.

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Table 1
Comparative Characteristics of Black and White Institutions
(BCU, N=10; WCU, N=71)

	Mean	SD	t-ratio	p-value
Total enrollment				
WCU	9068	9893.39	5.96	0.000
BCU	1823	1002.92		
Selectivity				
WCU	1074	133.57	8.05	0.000
BCU	725	77.32		
Instruction-related expenditure per FTE student				
WCU	8645	4477.19	3.27	0.002
BCU	6506	1208.22		
Percentage of instruction-related expenditure				
WCU	75.18	9.67	0.88	0.384
BCU	72.35	8.80		
Student-faculty ratio				
WCU	19.44	5.80	3.26	0.004
BCU	15.80	2.78		
Average faculty salary				
WCU	38322	8076.11	4.36	0.000
BCU	26814	5470.87		
Percentage of faculty with a Ph.D.				
WCU	79.68	12.57	3.99	0.000
BCU	62.80	12.20		
Percentage of students transferring before graduation				
WCU	13.59	7.11	-0.89	0.375
BCU	15.71	6.41		
Percentage of undergraduates receiving aid				
WCU	60.93	15.77	-4.46	0.000
BCU	84.00	11.10		

Table 2
Characteristics of African American Students in Black and White Institutions
(BCU, N=416; WCU, N=653)

	Mean	SD	t-ratio	p-value
Pretest: Academic ability				
WCU	3.87	0.71	5.07	0.000
BCU	3.64	0.72		
Pretest: Math ability				
WCU	3.40	0.96	3.87	0.000
BCU	3.16	0.95		
Pretest: Writing ability				
WCU	3.50	0.83	0.89	0.376
BCU	3.45	0.78		
Age [a]				
WCU	3.05	0.58	-1.73	0.085
BCU	3.11	0.56		
SAT				
WCU	922.39	187.63	16.52	0.000
BCU	738.73	159.48		
High school GPA				
WCU	5.51	1.66	8.87	0.000
BCU	4.58	1.69		
Parental income				
WCU	6.84	3.25	2.85	0.005
BCU	6.26	3.22		
Father's education				
WCU	4.80	2.12	3.17	0.002
BCU	4.38	2.10		
Mother's education				
WCU	4.85	1.93	0.31	0.760
BCU	4.81	2.09		

[a] Age was coded on a ten-point scale; a"3" on this scale corresponds to 18 years of age and "4" corresponds to 19 years of age. See the Appendix for a detailed coding scheme.

Table 3
Grand Means and Standard Errors of Outcome Variables and the Proportion of Institution-level and Individual-level Variability

Outcomes	Grand Mean (se)	Institution-level Variability	Individual-level Variability
Academic ability	3.910 (0.036)	25.2%	74.8%
Writing ability	3.801 (0.033)	15.4%	84.6%
Math ability	3.403 (0.039)	16.9%	83.1%

Table 4
Academic Ability as Dependent Variable
(Global College Model=Full Model)

Independent Variables	*Coefficients*	*se*	*t-ratio*
Institution-level Variables			
Intercept	1.4330	0.2803	5.112 ***
Mean pretest: academic ability	0.5019	0.0754	6.656 ***
Average income	0.0317	0.0158	2.005 **
Black college	0.0780	0.0815	0.957
Selectivity	0.0003	0.0002	1.131
Individual-level Variables			
SAT	0.0006	0.0002	4.001 ***
Pretest: academic ability	0.1792	0.0346	5.181 ***
High school GPA	0.0584	0.0148	3.935 ***
Income	0.0100	0.0064	1.573

Variance Component

Random Effect	*SD*	*df*	*Chi-square*	*p-value*
Institution-level variance	0.0061	76	75.3775	>0.500
Individual-level variance	0.6097			

Note: *** $p<=.01$; ** $p<=.05$; * $p<=.10$ *

Table 5
Writing Ability as Dependent Variable

Independent Variables	**Global College Model**			**Full Model**		
	b	*se*	*t-ratio*	*b*	*se*	*t-ratio*
Institution-level Variables						
Intercept	1.8134	0.4100	4.42***	1.4182	0.4450	3.19***
Global characteristics						
Mean pretest: writing ability	0.3500	0.0905	3.87***	0.3649	0.0900	4.05***
Black college	0.0774	0.1071	0.07	0.0469	0.1076	0.44
Selectivity	0.0006	0.0002	2.50**	0.0004	0.0003	1.40
Single-sex college	0.1317	0.0779	1.69*	0.1305	0.0759	1.72*
Internal characteristics						
Percentage of faculty with Ph.D.				0.0068	0.0032	2.17**
Individual-level Variables						
SAT	0.0003	0.0002	1.72*	0.0003	0.0002	1.72*
Pretest: writing ability	0.3159	0.0300	10.54***	0.3159	0.0299	10.56***
Female	0.0916	0.0558	1.64*	0.0916	0.0557	1.65*
Father's education	0.0261	0.0121	2.16**	0.0261	0.0120	2.16**

Variance Component

Global College Model

Random Effect	*SD*	*df*	*Chi-square*	*p-value*
Institution-level variance	0.0284	76	75.3958	>0.500
Individual-level variance	0.7376			

Full Model

Random Effect	*SD*	*df*	*Chi-square*	*p-value*
Institution-level variance	0.01615	75	70.89814	>0.500
Individual-level variance	0.73630			

Note: *** $p<=.01$; ** $p<=.05$; * $p<=.10$ *

Table 6
Math Ability as Dependent Variable
(Global College Model=Full Model)

Independent Variables	*Coefficients*	*se*	*t-ratio*
Institution-level Variables			
Intercept	1.6710	0.3306	5.06 ***
Mean pretest: math ability	0.6236	0.0710	8.78 ***
Black college	-0.1367	0.1071	-1.28
Selectivity	-0.0003	0.0003	-0.95
Single-sex college	0.0949	0.0746	1.27
Individual-level Variables			
SAT	0.0008	0.0002	4.21 ***
Pretest: math ability	0.4807	0.0267	18.00 ***
Father's education	-0.0263	0.0118	-2.22 ***

Variance Component

Random Effect	*SD*	*df*	*Chi-square*	*p-value*
Institutional-level variance	0.0066	76	57.7565	>0.500
Individual-level variance	0.7280			

Note: *** $p<=.01$; ** $p<=.05$; * $p<=.10$ *

Appendix
Variables and Coding Scheme

	Individual-level variables
Pretests	five-point scale, from 1=lowest 10% to 5=highest 10%
Academic ability	(All measured in 1985)
Mathematical ability	
Writing ability	
Student's gender	1=male and 2=female
Age of student on 12/31/89	ten-point scale from 1=16 or less, 2=17, 3=18 to 10=57 or more
SAT	students' combined SAT scores, ranging from 400 to 1600
High school GPA	average high school grades, eight-point scale from 1=D to 8=A or A+
Parental income	fourteen-point scale from 1=less than $6,000 to 14=$150,000 or more
Father's education	eight-point scale from 1=grammer school or less to 8=graduate degree
Mother's education	eight-point scale from 1=grammer school or less to 8=graduate school
Degree aspiration in 1985	Ph.D., M.D., D.D.S., D.V.M., LL.B., J.D., Doctor of Divinity =2, Master's degree, B.A.=1
Posttests	five-point scale from 1=lowest 10% to 5=highest 10%
Academic ability	(All measured in 1994)
Writing ability	
Mathematical ability	
	Institutional-level variables
Mean pretest of academic ability	aggregated from individual-level scores
Mean pretest of mathematical ability	
Mean pretest of intellectual self-confidence	
Mean pretest of writing ability	
Mean income	
Mean father's education	
Mean mother's education	
Black college (vs. white college)	1=historically white institution 2=historically black institution
Selectivity	institutional selectivity based on SAT combined scores, ranges from 400 to 1600
Institutional total enrollment	
Single-sex college	1=coeducational college, 2=single-sex college
Institutional control	1= public institution, 2=private institution
Total enrollment	
Percentage of undergraduates receiving aid	
Percentage of students transferring before graduation	
Total instruction-related expenditure per full-time enrollment (FTE)	
Percentage of total instruction-related expenditure	
Student-faculty ratio	
Average faculty salary	
Percentage of faculty with a Ph.D.	